

FINAL TECHNICAL REPORT

ONR Grant #N00014-90-J-1118

Robert Holman

Sand Bar Morphology As A Nonlinear Dynamical System

The focus of this grant has been on the statistics and dynamics of nearshore fluid motions and on aspects of the sediment response of natural beaches. Progress has been achieved through a combination of theoretical work and extensive sampling programs. We have learned about the dynamics of low frequency edge waves over strong longshore currents as well as hypothesizing a new mechanism for the providing energy for these and other low frequency nearshore motions. These theoretical predictions have been coupled with and tested against some excellent data sets (part of the Duck series of field experiments) and the statistics of wave energy of surf zone incident waves, infragravity waves, shear waves and swash have been characterized for the single-barred topography of Duck. The relative importance of different frequency bands seems to vary systematically over different coastal sites, primarily depending on a dynamically-defined beach steepness.

In addition, we have begun a systematic study of the large scale behavior of various nearshore sites with the development and deployment of Argus stations, remote unmanned video image processing stations that provide regular measurements of beach response at seven coastal sites around the world. These data have helped us constrain (or more specifically, to remove old incorrect intuitive constraints) the types of variability exhibited by beach systems with different environmental parameters. Interannual variability has been shown to be much different from previous expectations. The Argus program continues to grow and appears ready for transition to more applied labs of the Naval Forces.

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SEATTLE WA 98105-4631

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1. This confirms our conversations of 27 Feb 97 and 11 Jul 97. Enclosed are a number of technical reports which were returned to our agency for lack of clear distribution availability statement. This confirms that all reports are unclassified and are "APPROVED FOR PUBLIC RELEASE" with no restrictions.
2. Please contact me if you require additional information. My e-mail is *silverr@onr.navy.mil* and my phone is (206) 625-3196.

Robert Silverman
ROBERT J. SILVERMAN

LIST OF PUBLICATIONS

- Howd, P.A., J. Oltman-Shay and R.A. Holman. Wave variance partitioning in the trough of a barred beach, *J. Geophys. Res.*, 96(C7), 12,781-12,795, 1991.
- Howd, P.A., A.J. Bowen and R.A. Holman. Edge waves in the presence of strong longshore currents, *J. Geophys. Res.*, 97(C7) 11357-11371, 1992.
- Holman, R.A. and A.H. Sallenger, Jr., Sand bar generation: a discussion of the Duck experiment series, *J. Coastal Res.*, Special Issue No. 15, 76-92, 1993.
- Holland, K.T. and R.A. Holman. The statistical distribution of swash maxima on natural beaches, *J. Geophys. Res.*, 98(C6), 10,271-10,278, 1993.
- Lippmann, T.C. and R.A. Holman. Episodic, non-stationary behavior of a double bar system at Duck, North Carolina, USA, 1986-1991, *J. Coastal Res.*, Special Issue No. 15, 49-75, 1993.
- Holman, R.A., A.H. Sallenger, Jr., T.C. Lippmann and J. Haines, The application of video image processing to the study of nearshore processes, *Oceanography*, 6(3), 78-85, 1993.
- Holland, K.T., B. Raubenheimer, R.T. Guza, and R.A. Holman, Runup kinematics on a natural beach, *J. Geophys. Res.*, 100(C3), 4985-4993, 1995.
- Holman, R.A., Nearshore Processes, U.S. National Report to the IUGG (1991-1994), *Reviews of Geophysics*, Supplement, 1237-1247, 1995.
- Lippmann, T.C., R.A. Holman and A.J. Bowen, Generation of edge waves by modulations in break point amplitudes, *J. Geophys. Res.*, in review.
- Holland, K.T. and R.A. Holman, Video estimation of foreshore topography using trinocular stereo, *J. Coastal. Res.*, in review.
- Holland, K.T., C. Valentine and R.A. Holman, Wavenumber-frequency structure of infragravity swash motions, *J. Geophys. Res.*, in review.
- Holland, K.T. and R.A. Holman, Field observations of beach cusps and swash motions, *Marine Geology*, in review.